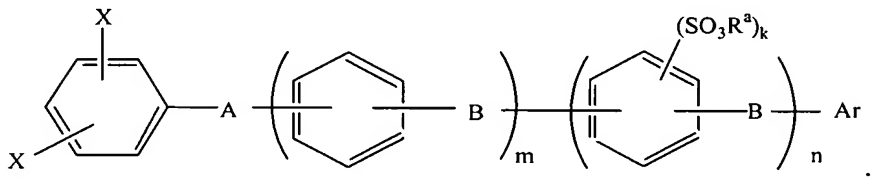
REMARKS

Claims 1-9 remain pending. Favorable reconsideration is respectfully requested.

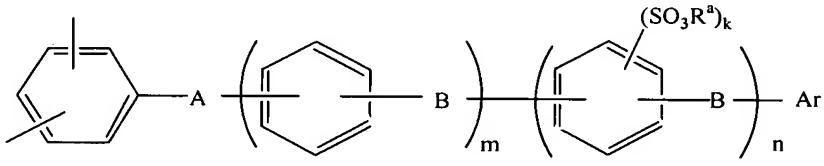
As set forth in Claim 1, the present invention relates to an aromatic sulfonic acid ester derivative represented by the formula (1):



...(1)

where the structural variables are defined in Claim 1.

The present invention also relates to a polyarylene comprising repeating structural units derived from an aromatic compound, which contains at least repeating structural units represented by the formula (1'):



...(1')

See Claim 5, where the structural variables are defined.

The rejection of the claims under 35 U.S.C. §103(a) over EP 1245554 (EP '554) is respectfully traversed. EP '554 fails to suggest the claimed aromatic sulfonic acid ester derivative or polyarylene.

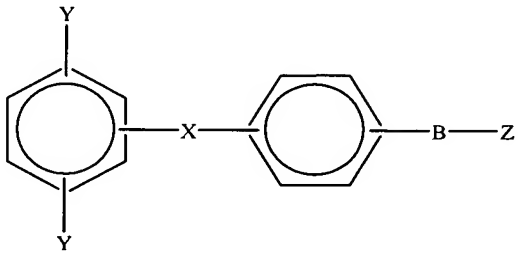
As described in the "Background of the Invention" section of the present application, sulfonated aromatic polymers are known as proton conductive materials, which are industrially produced in low cost with excellent durability and resistance to hot water. Typically, the polymers are prepared by polymerizing an aromatic compound and then allowing the resulting polymer to react with a sulfonating agent to introduce sulfonic acid groups into the polymer.

However, such conventional methods have many problems. For example, those methods require the use of large amounts of the sulfonating agent, which may be concentrated sulfuric acid, fuming sulfuric acid, chlorosulfuric acid, all of which are dangerous. In addition, the load of waste fluid treatment is high in recovering the polymer. Also, the conventional methods have problems in that no mechanism is in place to the controlling the amount of the sulfonic acid group introduced into the polymer and the ring position that the groups are introduced.

The present invention is intended to solve those problems. Thus, an object of the present invention is to provide a proton conductive material having excellent resistance to hot water and durability, which can be industrially produced in low cost.

Another object of the present invention is to provide a process for producing a polyarylene having a sulfonic acid without using a large amount of a sulfonating agent, and has a low load of treatment in recovering a polymer, and which also allows for controlling the amount of the sulfonic acid group introduced into the polymer and the position at which the sulfonic acid group is introduced.

EP '554 discloses a monomer of the formula (1):



(1)

The compound (1) (monomer) of the reference is used for polymerizing it alone or copolymerizing it with another to produce a polymer, which is then sulfonated using a sulfonating agent. That process produces a sulfonated polymer, as described in the Examples of EP '554.

In such a process, as described above, it is difficult to identify the position of the sulfonic acid group in the polymer and to confirm whether or not the sulfonic acid group was introduced in a polymer, although some position in the polymer structure is sulfonated.

As discussed above, the claimed aromatic sulfonic acid ester derivative of formula (1) is a monomer useful for introducing a sulfonic acid ester structure during the preparation of a polymer thereof. Therefore, a polymer having sulfonic acid groups at desired position can be produced by the use of this monomer.

The Examiner states that it would have been obvious to one of ordinary skill in the art to react the component (1) with a sulfonating agent under conditions to form the product of the claimed formula since they have been shown to be effective in a similar system and thus would have been expected to provide adequate results.

However, even if the monomer of the formula (1) of the reference has a sulfonic acid group ($-SO_3H$) and is subjected to polymerization, the polymerization is hard to accomplish due to the inhibition of polymerization during producing a sulfonated polymer.

In contrast, the aromatic sulfonic acid ester derivative of the present invention has a structure containing an aromatic group (-Ar) having a substituent represented by $-SO_3R^b$ where R^b is a hydrocarbon group of 1 to 20 carbons. By the introduction of the substituent: $-SO_3R^b$ rather than sulfonic acid group: $-SO_3H$, the inhibition of polymerization during production of a sulfonated polymer is eliminated.

Thus, the claimed aromatic sulfonic acid ester derivative of the formula (1) (monomer) is used for synthesizing a sulfonated polymer. Then, the substituent: $-SO_3R^b$ in the sulfonated polymer is converted to $-SO_3H$ by hydrolysis after the polymerization, to thereby obtain a polyarylene having a sulfonic acid group: $-SO_3H$.

As such, the aromatic sulfonic acid ester derivative of formula (1) of the present and the monomer of formula (1) of the reference are completely different in their structure use.

According, the monomer described in the reference fails to suggest the claimed aromatic sulfonic acid ester derivative or polyarylene.

In view of the foregoing, the claimed aromatic sulfonic acid ester derivative or polyarylene is not obvious over EP '554. Accordingly, withdrawal of this ground of rejection is respectfully requested.

Applicants submit that the present application is in condition for allowance. Early notice to this effect is earnestly solicited.

Respectfully submitted,

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